

# THE VALUE OF ENTEROSTOMY AND CONSERVATIVE OPERATIVE METHODS IN THE SURGICAL TREATMENT OF ACUTE INTESTINAL OBSTRUCTION,

WITH REMARKS ON THE IMPORTANCE OF OPERATIONS IN TWO STAGES,\*

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IN spite of the advances that have been made in methods and technie, the mortality after operative interference in acute intestinal obstruction is still a very high one. In the hands of different operators the mortality has varied between fifty and seventy per cent. Of 100 cases treated by operation, during 1906, in three large hospitals of this city, 54 per cent. died. Ranzi has recently collected 758 cases from literature, with a mortality of 57 per cent.<sup>1</sup> Other reports give a still higher death rate.

The majority of the patients present,—when seen by the surgeon,—advanced symptoms of obstruction; relatively few come to operation early when the manipulations necessary for the finding and relief of the obstruction are well borne.<sup>2</sup> This is due in many cases to the difficulties in making an early diagnosis, sometimes to delay on the part of the patient, sometimes to the very rapid progress of the symptoms.

Even if the very advanced cases—those in extremis—are excluded, the mortality after operations for acute intestinal obstruction will still be found to be a very high one—30 to 40 per cent. From the medical standpoint, this mortality can be diminished only by improvements in diagnostic methods, so that the patients can be referred to the surgeon more early; from

\* Read before the N. Y. Surgical Society, January 22, 1908.

<sup>1</sup> Among these cases were included strangulated hernia, acute pancreatitis, etc.

<sup>2</sup> In only about 10 to 15 per cent. of the cases admitted into Mt. Sinai Hospital is the patient's condition still to be called a good one.

the operative standpoint, the number of operative failures can only be decreased by greater simplicity in operative manipulations.

In a relatively small number of patients, the general condition is still a very good one, so that radical operative interference is fully justified. In the desperate cases all that can be done to relieve the urgent symptoms is to open and drain the bowel. There are a large number of cases, however, which, in point of severity, may be placed midway between those in desperate and those in good condition. These are usually subjected to radical operative interference. During the past two years, the writer has operated upon a number of such patients by performing an enterostomy of the most distended coil of intestine which presented when the abdomen was opened. No search was made for the cause of the obstruction nor was any effort made for its relief—unless the obstruction was at once met with and the freeing of the bowel a very simple matter. The cases herewith reported will show that the results were very satisfactory ones.

The operative indications in acute obstruction of the bowels are two-fold, the relief of the obstruction, and the withdrawal from the body, as rapidly as possible, of the retained and poisonous intestinal contents. It is now recognized that the presence of the retained intestinal contents is a very great, if not the most important factor in the production of grave symptoms. Powerful poisons are produced by the changes which the intestinal materials undergo, poisons which have a baneful influence not only directly upon the intestinal muscle, but also—as they are absorbed—upon the nervous system and upon the cardiac muscle (Albeck, Clairmont and Ranzi, Kukinla, Nesbitt, etc.). The sudden strangulation of a loop of gut—under a band, for example—may cause considerable abdominal shock, but how much more grave is the increasing shock from the virulent poisons formed in the obstructed bowel! The distention of the intestine with gas adds its deleterious effect, not only by pressing upward against the diaphragm, interfering with respiration and the

heart's action, but also by disturbing the circulation of blood in the bowel wall. This is in turn (Kader) followed by a formation of more gases and by increased distention. In most cases of acute intestinal obstruction, therefore, the gravity of the symptoms is due to those conditions which follow the obstruction rather than to the obstruction itself.

When the significance of the poisoning from the retained intestinal contents began to be recognized, and attention was turned to the question of their rapid elimination, it was thought that the best way to rid the body of these substances was by increasing peristalsis after the obstruction had been relieved [enemata, cathartics, injection of magnesium sulphate into the bowel (McCosh), etc.]. In many patients the operation for the obstruction was well borne, but death occurred after a few hours. Clearly, in not a few patients, this was due to the rapid absorption of the toxic substances by the healthy gut below the obstruction. Most operators then made it a rule,—either before or after the search for and relief of the obstruction,—to empty the distended loops of intestine of their gaseous and fluid contents by aspiration or incision followed by suture (McCosh, Mikulicz, Lennander, Dahlgren, and many others). This is the procedure most in vogue to-day. Another plan and one that has contributed much to diminishing the operative mortality, is to drain the intestine above the site of the obstruction at the same operation at which the obstruction is relieved. It would always be preferable to do the enterostomy first, if it were not that such a drained loop is often in the way in the search for the obstruction. Besides, there is the danger that the tube in the bowel may be disturbed during the manipulations, and a soiling of the peritoneal cavity occur. Therefore, one is apt to delay the opening of the bowel until after the obstruction has been relieved, or to close the opening before looking for the obstruction.

It is pertinent, therefore, to inquire whether,—in all patients, whose strength is at all diminished by the shock of the obstruction and the poisoning from the toxic materials

in the intestine,—better results would not be obtained if the surgeon always chose the simplest method for the relief of the intestinal retention. In other words, if the simple operation of opening and drainage of the bowel were done more often, we would more rarely see collapse during or at the conclusion of our operative manipulations in patients who had, at first, seemed to have sufficient strength to withstand the shock of the operation.

Simple enterostomy and drainage was once highly recommended. Treves advises against its use in all but exceptional cases. He calls it "a rough and ready operation, extreme, irrational, and blindly advised," and declares that such evidence as we possess is in favor of the operation only in "extreme cases in which the patient can only be submitted to a procedure of the slightest magnitude." He believes that not a few of the cases of recovery from intestinal obstruction that have been reported have been the subjects of erroneous diagnosis. He speaks very highly, however, of the establishment of an opening in the bowel after the obstruction has been found and relieved, and declares that this addition to the operation has reduced the mortality of the measure by fifty per cent.

For the reasons I have above stated, the objection of Treves, that one shall not blindly do an enterostomy for the relief of acute obstruction in any but desperate cases, seems to me too far-reaching.

It is hardly necessary to state that the operation of enterostomy is a very simple one; if necessary it can be done in a few minutes under local anaesthesia. It may be a life saving procedure in very desperate cases, of which the following was an example:

*CASE I.—Acute intestinal obstruction following upon a chronic obstruction; enterostomy and drainage under local anaesthesia; ileosigmoidostomy; resection of intestine and end to end anastomosis for persistent fecal fistula; recovery.*

Robert L., 45 years of age; seen with Dr. S. Basch; admitted March 7th, discharged cured May 13th, 1907. Ten years before the patient had an attack of abdominal cramps without vomiting, lasting seven days. Fifteen weeks before admission, he noticed that he had become gradually more and more constipated. About this time he had an attack of constipation with abdominal pain and nausea which lasted three days and was relieved by free catharsis. From that time until he was admitted to the hospital he had had, every few days, a similar attack, each time relieved by cathartics and enemata. He vomited during the most recent attacks. Never passed blood; never had fever; has lost 40 pounds in weight. Twenty-four hours before, he was suddenly attacked by severe cramps with vomiting, at first of food and then of feculent material; there was absolute constipation in spite of enemata and cathartics; for six hours he had vomited every few minutes, and was much exhausted.

The patient's condition, on admission, was a very poor one; his eyes were sunken and face pinched; his pulse was barely perceptible; extremities cold and clammy; he was vomiting almost continuously small amounts of intestinal contents. The abdomen was enormously distended and small intestine peristalsis was everywhere visible; on account of the enormous distention, and marked general tenderness, nothing definite could be found on palpation. Rectal examination negative. Although the condition seemed to be a hopeless one, he was nevertheless taken to the operating room.

Under Schleich anæsthesia the abdomen was opened through the fibres of the right rectus muscle (Dr. Elsberg). The intestines were much distended and of a dark blue color. One loop was pulled forward, a small opening made into it and drainage tube inserted and fixed into place by several tobacco-pouch sutures. A very large amount of fecal matter and much gas was expelled. Several other loops were incised and their contents evacuated and the openings closed by suture. The abdominal walls were closed around the tube by interrupted sutures. After the operation, which had lasted less than 15 minutes, the patient's condition improved somewhat; there was a profuse discharge of fecal matter through the tube. Twelve hours after operation the patient was much better, the pulse had become slower and of better quality; the abdomen was now soft and collapsed; the patient

had not vomited since the operation. Thereafter he made a good recovery.

Three weeks after the first operation, the abdomen was opened through the left rectus muscle and the attempt made to find the obstruction. There was a very dense mass of adhesions between the cæcum and lower coils of ileum which it was impossible to separate. An ileosigmoidostomy was then done in the usual way by suture, thus excluding the affected portion of intestine. Recovery from this operation was rapid and uneventful, and the patient began to gain flesh rapidly. The enterostomy opening could not, however, be made to close. On April 22nd the loop of small gut containing the opening was exposed and resected,—an end to end anastomosis by suture being made. Recovery from the third operation was also uneventful. The patient could be discharged cured with all of his wounds healed, free from all symptoms, and having gained more than thirty pounds, on May 13th, nine weeks after the first operation.

This patient was in a very desperate condition when admitted to the hospital. By the simple operation of enterostomy, it was possible to tide him over the acute symptoms and thus to save his life. At the second operation, when the patient was in good condition and there was no need of great haste, the adhesions around the obstructed bowel were found to be so dense that it was impossible to divide them. An ileosigmoidostomy had to be done. The patient had probably had an attack of appendicitis many years before; a search was made for the appendix at the second operation, but it could not be found.

In these desperate cases, no voice is raised against the operation of enterostomy. But in less grave cases, in patients who still seem to be in fair condition, whose circulation is still pretty good, who are not exhausted by the vomiting, the operation of opening and drainage of the bowel (without a search for the obstruction, except in the simplest cases) has few adherents. It is just in this class of cases that I believe that enterostomy should be done more often and the search for and relief of the obstruction left to a second sitting. This

is no more of an "extreme, irrational, and blindly advised" operation, than is the opening and drainage of the bladder as a preliminary to the removal of the prostate for urinary obstruction. Improved results in the operations for acute intestinal obstruction will be sure to follow an increased frequency of operations in "two stages."

Against the operation of enterostomy alone, a number of other arguments have been advanced.

1. The cause of the obstruction remains unrelieved.
2. There may be a gangrenous process present, or gangrene may set in unless the obstruction is relieved.
3. After the enterostomy, a fecal fistula will remain which may require a second operation for its closure.

*As to 1—*

It is true that if nothing is done but the enterostomy, the obstruction remains unrelieved, and further operative interference will in all probability be required. The dangers of an operation for obstruction when there are no acute symptoms are, however, so much less, and the technical difficulties so much smaller, that the division of the operation into two stages is justifiable.

In the presence of acute symptoms, the operation must usually be done hurriedly. As soon as the abdomen is opened, a large mass of distended intestines present. The shock from handling the bowel is a very great one. Even with the gentlest manipulations, the peritoneal covering of the bowel is apt to tear.

Very often there is no hope of finding the obstruction, unless more or less of the bowel is drawn out of the abdomen. This evisceration causes enormous shock, and the replacement of the intestines is often very difficult, even if a number of coils have been emptied by aspiration or enterostomy. It has been my experience that in the cases of acute obstruction in which it was necessary to drain the bowel as well as to relieve the obstruction, the mortality has been a very high one.

In some cases the drainage of the bowel will relieve not only the acute obstruction symptoms but also the obstruction.

Thus in obstruction by bands—especially if they are of recent origin—the emptying of the distended intestine may allow the obstructed loop to slip out from under the band. Or the recent adhesion will gradually stretch while the bowel is being drained. In the same way, drainage of the distended bowel above the obstruction may allow the volvulus to untwist, the kink to straighten out, etc. In the following cases of post-operative intestinal obstruction, the opening and drainage of the bowel not only relieved the acute symptoms but was curative.

*CASE II.—Acute gangrenous appendicitis, seropurulent peritonitis; appendectomy and drainage; post-operative intestinal obstruction due to adhesions; enterostomy and drainage; recovery.*

Mildred L., 9 years of age; seen with Dr. M. Bodenheimer; was admitted and operated upon for acute appendicitis with seropurulent peritonitis on August 14th, 1907. The patient made a rapid convalescence from the disease, the temperature was normal from the fourth day after operation. On the tenth day, the patient vomited and complained of abdominal pain, without temperature rise or other symptoms. The bowels, which up to that time had moved regularly, refused to move in spite of cathartics and enemata. Vomitus at first consisted of food but soon became feculent, and the patient's general condition became very poor. Eighteen hours from the first appearance of symptoms of obstruction, the abdomen was opened through the left rectus muscle, a loop of distended gut pulled into the wound, a tube inserted and the bowel drained. No attempt was made to find the obstruction on account of the poor condition of the patient. The child recovered rapidly after the operation. For the first few days there was a profuse discharge of fecal matter through the tube. After four days, the tube was clamped for 6 hours at a time; the following day the bowels moved per rectum. Three days later, the drainage-tube was removed; the opening was closed in ten days; the bowels moved regularly. The patient was discharged cured on September 21st and has remained well up to the present time.

*CASE III.—Acute gangrenous appendicitis, abscess; appendectomy and drainage; post-operative intestinal obstruction; enterostomy and drainage; recovery.*

Lionel S., 11 years of age; July 9th, 1905, appendicectomy and drainage for acute appendicitis with abscess; July 19th, first symptoms of intestinal obstruction; July 20th, enterostomy and drainage through left rectus incision; July 23rd, bowels moved per rectum; July 26th, drainage-tube removed; August 28th, enterostomy wound healed and bowels moving normally. Has remained well.

*CASE IV.—Acute gangrenous appendicitis, purulent peritonitis; appendicectomy and drainage; pneumonia with marked abdominal distention; acute intestinal obstruction; enterostomy and drainage; persistent fecal fistula; enterorrhaphy; recovery.*

Samuel L., appendicectomy and drainage, August 25th, 1907, for gangrenous appendicitis with diffuse purulent peritonitis; patient very septic. Double pneumonia of septic type lasting five days after operation. One week later, acute obstruction; marked distention; vomiting of large quantities of fecal matter; enterostomy and drainage; normal bowel movement on fourth day after operation; tube removed on ninth day; fecal fistula persisted. November 25th, edges of intestine freed and turned in with double row of sutures. Discharged cured December 19th.

The clinical picture, in the three patients, was a typical one of post-operative ileus. All three patients were relieved, not temporarily but permanently, of their obstructive symptoms by drainage of the bowel.

In these very recent cases of post-operative obstruction, it is preferable to open the abdomen a little distance away from the site of the first incision, because the intestines in the neighborhood of the former lesion are usually bound to each other by numerous fresh adhesions, which would require extended manipulations for their division. If the obstruction occurs months or years after the operation, it is advisable to open the abdomen through the original incision, as the probability of finding a single band or adhesion is much greater.

In general, it is advisable to open the abdomen directly over the obstructed bowel, if it is possible to locate the site of the obstruction. By a careful examination, the location of the obstruction can be determined with a fair amount of accuracy

in a large number of cases. One can then follow a methodical plan,—relief of the obstruction if found at once and remedied with ease, otherwise opening and drainage of the most distended loop.

In the following cases this plan was followed. In each patient the incision was made over the suspected area; in every one of the cases, the cause of the obstruction was at once found and relieved, although the operator was prepared to do no more than an enterostomy.

*CASE V.—Acute intestinal obstruction due to a band, two and one-half months after operation for acute appendicitis; laparotomy and division of band; recovery.*

Leo S., 14 years old. Seen with Dr. J. Reinthalter. Was attacked three days before with cramp-like pain in abdomen, abdominal distention, vomiting and constipation. The symptoms became gradually worse and the vomiting more frequent; there was absolute constipation. On admission, the abdomen was distended and rigid; there was some movable dulness in the flanks; marked hyperperistalsis. Operation May 16th, 1906, a few hours after admission (Dr. Elsberg). The abdomen was opened through the old scar; the peritoneal cavity contained clear fluid. Just underneath the abdominal incision was found a band of adhesions constricting two loops of ileum. This was divided between ligatures and the abdomen closed by layer sutures. The patient's bowels moved spontaneously a few hours after operation. Convalescence was uneventful. Discharged cured, May 28th, 1906.

*CASE VI.—Acute ileocolic intussusception; laparotomy and reduction; four weeks later, acute obstruction due to band; laparotomy and division of band. Five weeks later acute obstruction due to band; laparotomy and division of band; recovery.*

Irwin F., six months old; seen with Dr. D. E. Alexander; admitted April 30th, 1906. Three days history of abdominal pain, vomiting, constipation. Abdomen distended, hyperperistalsis; small soft mass in right iliac region. General condition fair. April 30th, laparotomy and reduction of ileocolic intussusception; apex of intussusception reduced with difficulty. Uncomplicated recovery.

Four weeks later the infant suddenly developed symptoms

of acute obstruction of the bowels,—vomiting, constipation, abdominal distention. The bowels refused to move in spite of enemata, and the child's condition became rapidly worse. May 24th, second operation, incision through old cicatrix in median line below umbilicus. The abdomen contained free fluid. The cecum was at once seen constricted by two bands which ran over it, from the ileum. Division of bands was easily accomplished, and the abdomen was closed. The bowels moved spontaneously twenty-four hours later; thereafter convalescence was uneventful.

Six weeks later the child again developed very severe symptoms of acute obstruction. Eight hours from the beginning of the symptoms, the abdomen was opened a third time, through the old scar. The small intestines were enormously distended. A band was at once found which ran from the cecum to the lower ileum and caused an obstruction of the ileum. The band was divided, the raw surface covered with peritoneum, and the abdomen closed without drainage. Recovery from the third operation was prompt and uneventful. The bowels moved on the day after operation. The patient was discharged cured on the ninth day after operation, and has remained well since.

*CASE VII.—Acute intestinal obstruction due to a band from adhesions after operation for appendicitis four years before; laparotomy and division of band; recovery.*

Aaron S., 14 years old; seen with Dr. T. I. Jacobus; admitted November 13th, discharged November 22nd, 1906. Operated on in another hospital for acute appendicitis four years before. Three days history of abdominal cramps and vomiting. Bowels have not moved for four days. General condition good; abdomen much distended; free fluid; hyperperistalsis. Operation November 13th (Dr. Elsberg): abdomen opened through old scar. As soon as the peritoneum was incised, a collapsed loop of small intestine was seen fixed to the posterior abdominal wall by a band, with distended bowel beyond it. Division of band; closure of abdomen in usual manner. Convalescence uneventful. Bowels moved twelve hours after operation; vomiting ceased at once. Has remained well.

*CASE VIII.—Acute gangrenous appendicitis; seropurulent peritonitis; appendicectomy and drainage; pelvic abscess; incision and drainage per rectum; acute intestinal obstruction due to band; laparotomy and division of band; recovery.*

Morris G., fourteen, was admitted and operated upon (Dr. Elsberg) March 7th, 1907, for gangrenous appendicitis with abscess and diffuse peritonitis. The appendix was removed and the abscess drained. Two weeks later a pelvic abscess was opened and drained through the rectum. Two weeks after this, when the patient was out of bed, he was suddenly attacked by severe cramps in the left lower abdomen with vomiting. The cramps became more severe and the vomiting more frequent. In the lower abdomen was felt a large distended loop of bowel. No fever or other symptoms. Patient passed neither flatus nor feces for twenty-four hours in spite of high and low enemata. Fourteen hours from the beginning of the symptoms, the abdomen was opened through the fibres of the left rectus muscle over the distended coil of intestine. Part of the ileum was found adherent to the left side of the pelvis by a band which kinked and obstructed the intestine. When the adhesion was divided, gas passed from distended to collapsed gut. The abdomen was closed with drainage. The vomiting ceased at once, an enema given soon after the operation was effectual; convalescence thereafter uneventful. Discharged cured, April 28th, seven weeks after the first operation.

CASE IX.—*Volvulus of sigmoid flexure due to congenital megalocolon; laparotomy and reduction; enterostomy and suture; recovery.*

Annie G., 20 years of age, admitted November 19th, 1907, with a history of no movement of the bowels for five days, vomiting, abdominal distention. The patient declared that she had always been very constipated since childhood, that for the last six months her bowels never moved unless she took a cathartic. On admission, the patient's general condition was a very good one, the abdomen was enormously distended, there was marked hyperperistalsis, a large distended coil of intestine could be seen bulging the lower part of the abdomen.

The abdomen was opened through a median incision below the umbilicus (Dr. Elsberg). At once an enormously distended, hypertrophied sigmoid flexure twisted upon itself for 180° presented in the wound. The loop was withdrawn from the abdomen and untwisted. It was so large that it could not be replaced until it had been emptied of gas and feces by an incision. The incision was closed, the bowel returned into the abdomen and the

abdominal wall closed with drainage. The bowels moved four days later. Convalescence was interrupted by a slight wound infection. She is at the present time almost entirely recovered.

In the five preceding cases, the cause of the obstruction was found and remedied with ease, so that enterostomy was unnecessary. The case of the infant who had an ileoileic intussusception, followed by two attacks of acute obstruction due to bands, is especially noteworthy. In all of these patients, no search had to be made for the cause of the obstruction; it was found at once as soon as the abdomen was opened. Therefore the operation could each time be done rapidly with little handling of the intestine. The conditions were different, however, in the following two patients; in both cases I had planned to do nothing but an enterostomy; in both the discovery of the cause of the obstruction, and its relief were easier than was anticipated. In the one ease, the extraction of a gall-stone from the ileum was accomplished with ease; in the second ease, the division of bands in the hernial sac could be done outside of the abdomen, with little handling of the intestine, and hence with little shock.

*CASE X.—Acute intestinal obstruction due to adhesions in a hernial sac; herniotomy, division of adhesions, reduction of intestines; recovery.*

H. R., male, 55 years of age, admitted November 27th, discharged December 13th, 1907. Reducible hernia for ten years. Four days ago the hernia became irreducible, bowels became obstinately constipated, vomiting became frequent. On admission there was a large irreducible inguinal hernia on the left side. The hernial sac was opened through a four-inch incision (Dr. Elsberg). There was a large mass of small intestine in the hernial sac, several loops of which were bound to each other and to the walls of the sac by several firm adhesions. After these had been divided, the intestines were reduced with ease. The neck of the sac was very large. The peritoneum was then closed by a running suture at the base of the sac. Convalescence was rapid and uneventful. The patient was given a truss; no radical opera-

tion was attempted. The bowels moved twelve hours after operation, and regularly thereafter.

The patient's general condition on admission was a good one, although the vomiting was feculent in character.

*CASE XI.—Acute intestinal obstruction due to gall-stone occluding the upper ileum; enterotomy and extraction of calculus; recovery.*

Mrs. B., 62 years of age; seen with Dr. S. Neuhof; admitted April 28th, discharged June 27th, 1906. Gave a history of frequent attacks of abdominal pain for many years. Never was jaundiced. Four days before admission she suddenly complained of severe abdominal cramps, vomited, and had slight fever. For two days she vomited everything taken into the stomach, but the bowels moved with enemata. Thereafter she passed neither flatus nor feces, the vomiting continued and became more frequent; for the last six hours it was distinctly fecal. The abdomen became distended and everywhere tender. The patient was a very stout lady; her condition was poor; the pulse rapid and weak; she was much prostrated. Every few minutes, a distended rigid coil of intestine was to be felt to the right and above the navel. No tumor palpable; rectal examination negative; no jaundice.

As soon as the patient could be transferred to the hospital, the abdomen was opened by an incision to the right and at the level of the umbilicus, over the distended intestine (Dr. Elsberg). The distended loop was drawn up into the wound in order to open and drain it. At once a tumor was felt in this loop which proved to be a large calculus occluding the bowel. The intestine was incised, the calculus extracted, and the incision closed with a double row of Lembert sutures. The abdomen was rapidly closed with drainage.

The patient was considerably shocked by the operation but recovered after energetic stimulation. The vomiting persisted for 24 hours and then ceased. After a very complicated and slow convalescence the patient was discharged cured on June 27th, 1906.

Even in those cases in which the obstruction can be found and relieved with ease, it is often preferable at the first operation to do nothing more than drain the intestine. Had I done this in the following case, the operation would have taken less time and the unfortunate outcome might have been prevented.

The patient's condition was a poor one, the intussusception lay directly under the abdominal opening, its reduction was accomplished with ease; nevertheless the handling of the bowel must have added much to the existing shock. In the future, in a similar case, I should do nothing more than an enterostomy, no matter how great the temptation to reduce the intussusception.

*CASE XII.—Acute ileocolic intussusception; laparotomy and reduction; death.*

Bella P., 7 months of age, admitted and died March 12th, 1907. Three days history of constipation with vomiting. Vomiting fecal on the day before admission. General condition very poor; pulse hardly perceptible. Abdomen distended; hyperperistalsis; in right lower abdomen doughy mass to be felt. Incision over mass through right rectus fibres. Abdomen filled with clear fluid. Intussusception found at once drawn into wound; reduction easily accomplished. About 12 inches of ileum invaginated. Abdomen rapidly closed. Operation lasted 11 minutes. Condition of patient did not improve, death occurred a few hours after operation.

2. It has been advanced as an argument against the operation of enterostomy in acute obstruction of the bowels, that if the obstruction is not looked for, gangrenous intestine may be left in the abdomen, or unless the constriction is relieved a constricted part of the bowel may become gangrenous. The frequency of gangrene is not, however, as great as is commonly believed. I have carefully studied the records of Mt. Sinai Hospital, of other institutions, and the reports in the literature of the subject.

During the last four years, 54 patients with acute intestinal obstruction were operated upon at Mt. Sinai Hospital. In 7 of these cases, or 13 per cent., gangrenous intestine was found at the operation or autopsy (intussusception, 4 cases; volvulus, 2 cases; Meckel's diverticulum, 1 case). Philipowicz has recently reported 80 cases of ileus, in 16 (20 per cent.) of which gangrenous gut was found at operation (volvulus,

11 cases; intussusception, 1 case; Meekel's diverticulum, 2 cases; bands, 2 cases). There was gangrene in 5 of Ranzi's 35 cases (14 per cent.), (volvulus, 1 case; bands, 2 cases; tumors, 2 cases). If the above figures be added together we have 28 cases of gangrene; 19 or 70 per cent. of these were cases of volvulus or intussusception. Gangrene of the intestine is present therefore only in about 15 per cent. of cases of acute intestinal obstruction, and 70 per cent. of the patients with gangrene have either a volvulus or an intussusception. In these latter cases, the cause of the obstruction is usually found with ease, and the gangrenous intestine can therefore quickly be brought outside of the abdomen to be dealt with at a later operation. Excluding intussusception and volvulus, gangrene occurs in about 5 per cent. of patients with acute obstruction. The risk of leaving behind gangrenous gut by the performance of enterostomy alone is therefore a small one.

There is no doubt that, in many cases, the drainage of the distended gut will have a beneficial effect upon a constricted or obstructed loop of gut, and may prevent a threatened gangrene. If gangrenous gut is found at the operation, it is preferable to bring it outside the wound and anchor it there by a few sutures. At any time after the patient has recovered somewhat from his obstructive symptoms, the gangrenous bowel can be excised.

If this plan had been adopted in the following case, the patient would have stood a better chance of recovery.

**CASE XIII.**—*Volvulus of intestine due to gangrenous Meekel's diverticulum; excision of diverticulum; enterostomy; death.*

Morris E., aged 20, was admitted to the hospital on February 20, 1906, with a history that for three days he had abdominal pain with vomiting and constipation. The vomiting had not been very frequent but the pain had been constant and increasing. Bowels had not moved since onset of illness. The patient's general condition was fair; the abdomen was distended and rigid; the entire lower part of the abdomen was tender; there was only slight fever; the pulse was of good quality and not rapid. An

enema was given soon after the patient entered the ward, and the bowels moved freely. The pain also became less but the abdominal distention persisted. His condition steadily improved until the fourth day. Then the abdominal pain returned and became very severe, the patient began to vomit again, the bowels refused to move. Within an hour his condition became poor, the vomiting grew more frequent, the pulse became rapid and feeble.

He was taken to the operating-room at once and the abdomen rapidly opened by an incision through the right rectus muscle (Dr. Elsberg). The small intestines were much distended. One distended coil was withdrawn from the abdomen, and immediately beneath it was found a small piece of gangrenous gut, which proved to be a Meekel's diverticulum adherent to a loop of lower ileum in such a way that the latter was twisted upon itself for 360°. The diverticulum was freed from its adhesions and tied off at its base and removed, the loop of gut untwisted, and the abdomen rapidly closed with drainage.

The patient was in very poor condition at the close of the operation and his condition remained poor. Twelve hours later the abdomen was again opened through the former incision, a distended loop of intestine pulled forward, opened and drained in the usual manner. The enterostomy did not, however, prevent the fatal outcome, which occurred about 12 hours later.

There is no doubt in my mind that the correct procedure in this case would have been to have brought the gangrenous diverticulum outside of the abdomen and to have established an enterostomy above it. This could have been done in one-half or one-third of the time and would have entailed much less handling of the intestines.

3. Another objection that has been urged against the opening and drainage of the bowel in all but desperate cases, is that a fecal fistula will remain, which may require a dangerous operation for its closure. If the enterostomy is properly done, a fistula will remain in only a small proportion of the patients. The best method for the performance of an enterostomy is that which embodies the principle of the Kader gastrostomy. Two circular sutures are placed in the wall of

the bowel to be opened; a small incision is then made, a catheter inserted; the catheter fixed in the wall of the bowel by a silk stitch, and the two circular sutures then tied. The inner of the sutures is tied first, the catheter being pushed into the bowel. In this manner a canal lined by serous membrane is formed which will close rapidly as soon as the catheter is withdrawn.

The bowel is then attached to the peritoneum along the margins of the abdominal wound by one or two sutures, and the abdominal wound closed around the tube. If the patient's condition is very poor, the small incision in the abdominal wall can be packed with gauze. The tube from the intestine is led over the side of the patient's bed into a bottle or receptacle. There is no leakage by the side of the tube, the dressings remain clean. When the tube is withdrawn the opening in the bowel closes very rapidly.

If the drainage of the bowel is done in the manner above described, and if the obstruction has been relieved, a fecal fistula will remain in only a small proportion of the patients. A persistent fistula can be closed by a lateral enterorrhaphy. Sometimes, however, an intestinal resection will be required.

There is one danger after enterostomy which merits careful consideration. If the obstruction is located in the jejunum, the opening and drainage of the bowel may result in very rapid starvation. Obstruction of the jejunum forms, however, only a small percentage of the cases and the clinical recognition of these cases is often possible. If the enterostomy has been made high up in the small intestine, the delay before the second operation must be a short one—24 to 48 hours.

The cases above reported, 13 in number, represent all the cases of acute obstruction of the bowels, exclusive of strangulated hernia, that have been operated upon by the writer during the past two years on the Second Surgical Service at Mt. Sinai Hospital, and in private practice. The writer deems the following the best working plan for the operative treatment of acute obstruction of the bowels:

A.—*The patients in good condition*—here a more or less prolonged search for the obstruction is allowable.

B.—*The patients in very poor condition*—opening and drainage of the most distended loop of intestine. The incision in the abdomen should be, if possible, over the site of the obstruction; it should be as small as possible. The bowel should be drained by a catheter, fixed in the bowel according to the method of Kader, and the bowel should be fixed to the parietal peritoneum by one or two stitches.

C.—*The patients in fair condition*—relief of the obstruction if the same be found at once when the abdomen is opened, and if the relief can be accomplished without complicated manipulations. In all other cases, opening and drainage of the bowel, perhaps with fixation of affected loop of intestine in the wound or outside of the abdomen. Relief of the obstruction at a second operation.

#### CONCLUSIONS.

1. Operative interference for acute intestinal obstruction should very often be divided into two stages.
2. Enterostomy and drainage should be the operation of choice, not only in the desperate cases, but also in many patients whose condition is still a fair one.
3. Prolonged search for the obstruction and its relief should, in all patients excepting those in very good condition, be delayed until the acute symptoms have been relieved by the opening and drainage of the bowel.
4. The danger of leaving behind gangrenous intestines is a small one, it is smaller than the danger from prolonged manipulations.
5. When gangrenous intestine is present it is preferable to bring it outside of the abdomen and deal with it later; the obstructive symptoms being meanwhile relieved by enterostomy.
6. Enterostomy, thus done, is not an "extreme, irrational and blindly advised" operation, but one that embodies a dis-

tinet therapeutic principle,—alleviation of acute symptoms as the first step in the relief of a pathological condition.

7. The operation of enterostomy may permanently relieve acute intestinal obstruction.

8. Fecal fistulae will remain in only a small proportion of the cases in which enterostomy has been done, if the opening and drainage is made according to the Kader principle.